

**REMARKS**

The independent claims have been amended to include the limitations heretofore contained within the objected-to claims. Applicants respectfully submit that independent claims 18, 32, 46, 62 and 77 are therefore now allowable over the prior art of record. Furthermore, given that their limitations have been incorporated into the independent claims, the previously objected-to claims 22, 50 and 66 have been canceled. Various dependent claims have also been amended to accommodate the changes to the independent claims.

**I. Summary of Rejections of Claims**

In the 35 U.S.C. §112, second paragraph, rejection of claims 46-60, 62-76 and 77-81, the Examiner alleges that:

[The] use of the phrase - 'conductive member(s)' - makes these claims indefinite. Applicant is required to be more specific about the nature of the conductive member(s).

In the 35 U.S.C. §102(b) rejection of claims 62-65, 67, 70 and 72-76, the Examiner alleges the following:

As regards to claim 62, Srinivasan et al teach a coil for use with a magnetic resonance system, including a first end having a first diameter and a second end having a second diameter, which is different from the first diameter (figure 2, numerals 40 and 84). The coil has a plurality of conductive rods extending between the first and second ends, and each of the rods having a linear portion connected to a first end, and the tapered portion connected to the second end to inherently provide the coil with a substantially homogeneous pattern of magnetic flux density in at least one of the three orthogonal imaging planes (figure 2, numerals 40, 82 and 84).

As regards to claims 63-65, 67, 70, and 72-76, Srinivasan et al teach a versatile conductive/reactive rings birdcage coil with the same or different diameter ends connected by conductive/reactive rods.

In the 35 U.S.C. §102(e) rejection of claims 32-33, 35-36, 77-78 and 80-81, the Examiner asserts that:

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As regards to claim 32, Yeung teaches a coil for use with a magnetic resonance imaging system to form images of a region of interest during scanning procedure, including an electrically conducting ring at one end of the coil having a diameter and a second electrically conductive ring at the second end having a second diameter (figures 2a, 3a, numerals 20, 22, 30, 32). The coil has a plurality of electrically conductive rods extending between the first and the second ends, so that each of the electrically conductive rods, at each end thereof having a tapered portion, said tapered portions being selected to maximize homogeneity of magnetic flux density in said coil (figure 2a, 3a; numerals 24, 26).

As regards to claim 77, Yeung teaches a coil for use with a magnetic resonance system, including a first end having a first diameter and a second end having a second diameter (figures 2a, 3a; numerals 20, 22, 30, 32). The coil has a plurality of electrically conductive rods extending between the first and the second ends, so that each of the electrically conductive rods, at each end thereof having a tapered portion, said tapered portions being selected to maximize homogeneity of magnetic flux density in said coil (figure 2a, 3a; numerals 24, 26).

As regards to claims 33, 35, 36, 78, 80 and 81, Yeung teaches a birdcage coil, having first and second equal diameter rings, and also the coil having the two end diameters are smaller than the center diameter of the coil (figures 1 and 2a).

In the 35 U.S.C. §103(a) rejection of claims 18-21, 25, 27-31, 46-49, 51-54 and 56-60, the Examiner makes the following allegations:

As regards to claim 18, Srinivasan et al teach a coil for use with a magnetic resonance imaging system to form images of a region of interest during scanning procedure (figure 1). The coil has a first electrically conducting ring at its one end having a first diameter (figures 1 and 2, numerals 40), and a plurality of rods in electrical communication with the first ring (figure 2, numerals 82). Each of the rods has a linear portion and a tapered portion, wherein the linear portion is connected to the first ring (figure 2, numerals 40, 82). Srinivasan et al do not specifically teach a second ring having a second diameter, which is different from the first diameter of the first ring (instead teach a circular electrode having a different diameter than the diameter of the first ring, and the circular electrode is connected to the tapered end portions of the rods, see figure 2, numeral 84). Adrian et al teach a second ring having a second diameter, which is different from the first diameter of the first ring of the coil (made of two coils, the two ends of the coil are connected by separate conductive linear and tapered overlapping rods for the system to work as one coil unit efficiently after proper adjustment; figure 1, column 2, paragraph 2, lines 1-6). It would have been obvious to one of ordinary skill in the art to adapt the second conductive ring having a second diameter of Adrian et al, which is electrically connected to the end of the tapered conductive rods (see col. 2, as shown in figure 1) in place of the circular electrode of Srinivasan et al (figure 2, numeral 84) to avoid adjustment of overlap between the two coils of the coil of Adrian et al, which is critical for proper functioning of the coil for improving image quality.

As regards to claim 46, Srinivasan et al teach a coil for use with a magnetic resonance system, including a plurality of electrically conductive members each having a linear portion and a tapered portion (figures 1 and 2, numerals 82), and the electrically conductive members are arranged to form a first opening having a first diameter (figure 2, numeral 40), inherently providing the coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said coil (column 2, lines 25-54). Srinivasan et al do not specifically teach an electrically conductive second opening of the coil having a second diameter (instead teach a circular electrode having a second diameter, which is different from the first diameter of the first opening). Adrian et al teach an electrically conductive second opening of a coil having a second diameter (made of two coils, having two different diameter circular end openings, figure 1, column 2, paragraph 2, lines 1-6). It would have been obvious to one of ordinary skill in the art to adapt the second opening of the coil of

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Adriany et al (see coil 2, as shown in figure 1) in place of the circular electrode of the coil of Srinivasan et al (figure 2, numeral 84) to avoid adjustment of overlap between the two coils of the coil of Adriany et al, which is critical for proper functioning of the coil for improving image quality.

As regards to claims 19, 21, 27-31, 47, 49, 51-53, and 56-60, Srinivasan et al teach a versatile birdcage coil with reactive elements as a transmitter receiver birdcage coil with different diameter first and second end rings (figure 1, 2, 6).

As regards to claims 20, 25, 48 and 54, Srinivasan et al do not teach two circular coils with different diameters. Adriany et al teach two circular coils with different diameters. It would have been obvious to one of ordinary skill in the art to adapt Adriany et al's teachings with the teachings of Srinivasan et al to create a coil with improved homogeneity of the created magnetic field to improve image quality.

In the objections to claims 22-24, 26 and 34, the Examiner noted that:

[These claims] are objected to as being dependent upon a rejected base claim(s), but would be allowable if rewritten in independent form including all of the limitations of the base claim(s) and any intervening claims.

**II. Response To Rejections of Claims**

**A. Response To Rejection Of Claims 46-60, 62-76 & 77-81 Under 35 U.S.C. 112, Second Paragraph, As Being Indefinite**

Applicants have amended the claims to overcome this rejection.

For example, in independent claim 46 and others, Applicants have deleted the term "conductive members" and replaced it with "conductors." The Examiner was correct in asserting that the term "conductive member(s)" did not appear in the specification.

Unlike "conductive member," the term "conductor" has widespread and broad support in the specification. For example, it covers the rings of the coil, as well as the rods/legs. (See ¶s 42, Substitute Specification, filed 16 Dec 2002) The specification also refers broadly to "conductor geometry patterns" and "other conductor patterns." (See ¶s 24, 26, 39, 40, 46 and 50, Substitute Specification) Consequently, though the term "conductor" includes rings and/or rods, it is not

intended to exclude other manifestations or shapes such as loops or "other geometric conductor patterns" (See ¶s 26 and 46, Substitute Specification) Nor does the term exclude conductive rods from being part of such loops or "other geometric conductor patterns." (Id.)

Applicants believe that the claims as amended overcome the indefiniteness rejections under 35 U.S.C. §112, second paragraph.

**B. Response To Rejection Of Claims 62-65, 67, 70 & 72-76 Under 35 U.S.C. 102(b) As Being Anticipated By Srinivasan et al.**

Applicants respectfully assert that the *Srinivasan et al.* patent does not anticipate the subject matter recited in claims 62-65, 67, 70 and 72-76, particularly given the amendments made to claim 62 herein. Independent claim 62 now recites a coil that includes "a first end defining a first opening having a first diameter" and "a second end defining a second opening having a second diameter." (emphasis added)

*Srinivasan et al.* do not disclose such a coil. Although the *Srinivasan et al.* head coil shown in Figures 2-5 includes a first end 80 having a diameter, it does not include a second diameter defining a second opening at its other end. More specifically, *Srinivasan et al.* teach that:

The [head] coil includes an end ring 80 to which a plurality of legs 82 are connected electrically. \* \* \* [At [t]he diagonally opposite [end,] the legs are electrically shorted together at a junction point. [Col. 4, lines 15-20]

In other words, *Srinivasan et al.* teach a head coil that has a ring 80 at one end to which legs 82 are connected. At the end opposite that ring 80, however, the legs 82 are "shorted together" where they meet at a "junction point," also referred to as a "common, virtual ground." (Col. 4, lines 19-20; lines 28-31) Given the other end converges to a point, the domed birdcage of *Srinivasan et al.* does not have "a second end defining a second opening...."

Given the foregoing amendments and arguments, Applicants submit that *Srinivasan et al.* patent does not anticipate the invention claimed in claims 62-65, 67, 70 and 72-76. Applicants therefore request that the rejection under 35 U.S.C. §102(b) be withdrawn.

**C. Response To Rejection Of Claims 32-33, 35-36, 77-78 & 80-81 Under 35 U.S.C. 102(e) As Being Anticipated By Yeung**

Applicants have amended independent claims 32 and 77 to overcome this rejection. The amendments also avoid the rejections applied to the other claims by the Office Action of 23 December 2003. For example, claim 32 has been amended so that "each of said rods" have "a linear portion" as well as a "tapered portion," a limitation that *Yeung* does not teach. Claims 32 and 77 have also been amended to include the limitations formerly found in objected-to claim 22, similar to the amendments made to claim 18 above.

It is believed that these and other amendments assure that subject matter of claims 32-33, 35-36, 77-78 and 80-81 is novel over the teachings of the *Yeung* patent. Applicants therefore request that the rejection under 35 U.S.C. §102(e) be withdrawn.

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**D. Response To Rejection Of Claims 18-21, 25, 27-31, 46-49,  
51-54 & 56-60 Under 35 U.S.C. 103(a) As Being Unpatentable  
Over Srinivasan et al. And Adriany et al.**

Applicants have amended independent claims 18 and 46 to render them allowable consistent with the Examiner's suggestions in the Office Action. For example, claims 18 and 46 have been revised to include the limitations formerly found in objected-to claim 22.

Given the foregoing amendments, Applicants believe that independent claims 18 and 46 are patentably distinct over the *Srinivasan et al.* patent and *Adriany et al.* reference. By virtue of their dependency on amended claims 18 and 46, claims 19-21, 25, 27-31, 47-49, 51-54 and 56-60 likewise overcome that rejection. Applicants therefore respectfully request withdrawal of the 35 U.S.C. §103(a) rejections of those claims.

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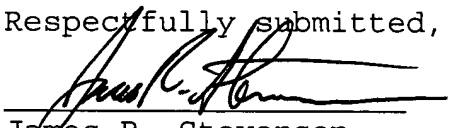
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**CONCLUSION**

Given the foregoing arguments and amendments, Applicants respectfully requests withdrawal of the objections and rejections set forth in the Office Action dated December 23, 2003. Applicants believe that the application is now in condition for allowance, and thus ready to issue as a U.S. Patent. If the Examiner has any questions regarding this *Response and Amendment*, he is invited to call the undersigned attorney at the telephone number listed below.

A *Petition For One-Month Extension Of Time* accompanies this *Response and Amendment*.

Respectfully submitted,

  
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